IRIS

IRIS human health assessments contain information that can be used to support the first two steps (hazard identification and dose-response analysis) of the risk assessment paradigm. IRIS assessments are scientific reports that provide information on a chemical's hazards and, when supported by available data, quantitative toxicity values for cancer and noncancer health effects. IRIS assessments are not regulations, but they provide a critical part of the scientific foundation for decisions to protect public health across EPA's programs and regions under an array of environmental laws (e.g., Clean Air Act, Safe Drinking Water Act, Comprehensive Environmental Response, Compensation, and Liability Act, etc).

RECENT REVIEWS

GAO

In 2009, GAO identified EPA's Integrated Risk Information System (IRIS) Program as a high risk area needing broad-based transformation. GAO expressed concern in 2008 that the IRIS database was at serious risk of becoming obsolete because EPA had been unable to keep its approximately 550 existing assessments current or complete new assessments of important chemicals of concern. GAO reiterated their previous concerns regarding the thwarting of EPA's efforts to finalize assessments by a combination of factors, including (1) two new mandatory reviews of IRIS assessments by the Office of Management and Budget (OMB) and other federal agencies (April 10, 2008 process); (2) EPA management decisions, such as delaying some assessments to await new research or analyses; and (3) the compounding effect of delays—even one delay can have a domino effect, requiring the process to essentially be repeated to incorporate changing science.

In response, the EPA Administrator requested a proposal to streamline the IRIS assessment development and review process and to address the GAO recommendations. An action plan was developed by NCEA and submitted to the Administrator in March 2009. On May 21, 2009, the Administrator announced a new streamlined IRIS process that addressed issues of transparency, program management, and timeliness.

GAO's 2011 and 2013 High Risk Reports stressed the need for effective implementation of the 2009 IRIS process changes and reiterated the importance of completing timely and credible assessments, decreasing the backlog of ongoing assessments, and address issues concerning clarity and transparency.

NRC

In April 2011, the National Research Council (NRC), in their report *Review of the Environmental Protection Agency's Draft IRIS Assessment of Formaldehyde*[1], made several recommendations to EPA for improving IRIS assessments and the IRIS Program. The NRC's recommendations were focused on the first step of the IRIS process, the development of draft assessments. Consistent

[1] National Research Council, 2011. Review of the Environmental Protection Agency's Draft IRIS Assessment of Formaldehyde.

with the advice of the NRC, the IRIS Program is implementing these recommendations using a phased approach and is making the most extensive changes to assessments that are in the earlier stages of the IRIS process.

In 2012, EPA contracted with the NRC to conduct a comprehensive review of the IRIS assessment development process and changes that are currently being made or planned by EPA. The NRC also reviewed current methods for integrating and weighing scientific evidence for chemical hazard identification. The NRC convened two public meetings related to this project: 1) a September 2012 meeting to kick off their review of the IRIS assessment development process; and 2) a December 2012 meeting to discuss EPA's current and future process for developing IRIS assessments, including topics on identifying, evaluating, and integrating evidence, selecting studies, and calculating toxicity values. We also asked the NRC to convene a public workshop to obtain input from the scientific community, as well as stakeholders and the public, on weight-of-evidence considerations. This workshop was held in March 2013.

Additionally, the NRC reviewed documents submitted by the IRIS Program which provide information about the changes that have been or are being made in the IRIS Program along with chemical-specific examples of how the Program is implementing NRC recommendations. The NRC considered these materials as they reviewed the IRIS assessment development process.

In May 2014, the NRC released their report reviewing the IRIS assessment development process. In this report, the NRC applauds EPA's efforts to improve IRIS and finds that the Program has moved forward steadily in planning for and implementing changes in each element of the assessment process. The report also notes that EPA has made substantial improvements to the IRIS Program in a short time. They specifically note that, "overall, the committee finds that substantial improvements in the IRIS process have been made, and it is clear that EPA has embraced and is acting on the recommendations in the NRC formaldehyde report."[2]

IRIS ACCOMPLISHMENTS

From May 21, 2009 (when the new IRIS process went into place) to June 01, 2014, NCEA has completed 27 IRIS assessments. These completions included some of the Agency's highest priorities such as trichloroethylene, tetrachloroethylene, and dioxin (noncancer). The most recent completions include biphenyl, 1,4-dioxane, and methanol (non-cancer). NCEA has also made significant progress on several other high profile assessments such as formaldehyde, inorganic arsenic, chromium VI, benzo[a]pyrene, and Libby asbestos. In addition, EPA's IRIS Program is developing assessments of health effects for chemicals found in environmental mixtures such as polycyclic aromatic hydrocarbons (PAHs), phthalates, and polychlorinated biphenyls (PCBs). These cumulative assessments will increase the number of chemicals that are addressed by the IRIS Program and are based upon the expressed needs of the Agency.

NCEA has also initiated or completed numerous significant actions that address the recommendations resulting from the reviews outlined above. In response to these reviews, the

[2] National Research Council, 2014. Review of EPA's Integrated Risk Information System (IRIS) Process.

IRIS Program developed several new initiatives and, in July of 2013, EPA announced a series of enhancements to its IRIS Program aimed in order to produce high quality scientific IRIS assessments in a timely and transparent manner. These enhancements incorporated additional opportunities for stakeholder and public engagement at various stages of the IRIS process and are directly responsive to concerns raised by the GAO, as well as the NRC's recommendations related to improving the development of IRIS assessments and advancing risk assessment in general.

Below is a description of the new initiatives, actions and enhancements recently completed or underway within the IRIS Program for FY 2014.

Dedicated Chemical Assessment Advisory Committee - Implemented

EPA's SAB has established a new standing committee, the Chemical Assessment Advisory Committee (CAAC), to review IRIS assessments. In the past, the SAB formed a new committee for each chemical assessment that the SAB reviewed. The new CAAC is designed to provide the same high-level, transparent review as previous SAB reviews, but provide more continuous and overlapping membership for consistent advice.

The draft IRIS assessments of ammonia and 1, 2, 3-, 1, 2, 4-, and 1, 3, 5-trimethylbenzenes (TMBs) were the first IRIS chemicals to be sent to the CAAC and the peer reviews for both are currently underway. The panel meetings are scheduled to take place before the end of FY 2014. They will be followed later this year by the draft benzo[a]pyrene assessment and the draft ethylene oxide assessment.

Planning and Scoping– Implemented

The IRIS Program is now developing Planning and Scoping summaries for new chemicals and chemicals in early stages of the IRIS process, and conducting internal meetings to identify EPA needs for the assessment. The scoping process involves collecting background information on the chemical, its predominant uses, and the pathways through which humans can be exposed. This early consultation helps ensure that the assessment meets the needs and critical timelines of Agency decision-makers.

In FY 2014, the IRIS Program conducted planning and scoping for several chemicals, including HBCD and DEP. This information was provided in the associated preliminary materials released to the public prior to assessment development.

Problem Formulation– In Progress

The IRIS Program has begun to conduct problem formulation for chemicals prior to assessment development. During this phase, EPA identifies certain scientific elements or data that will be important for developing an assessment. Problem Formulation, as conducted within the IRIS Program, draws upon information from other assessments by state, federal and international health agencies to identify scientific issues and studies that may inform EPA's plan for

developing the assessment. The IRIS Program will release this information to the public and discuss it at a public meeting.

Problem formulation materials for napthalene and ethylbenzene will be discussed at an IRIS public bimonthly meeting later in FY 2014.

Preliminary Materials for IRIS Assessments – Implemented

As part of the enhanced IRIS process, EPA has committed to the release of preliminary materials in the early stages of developing the draft assessment. These materials include the literature search and screening strategy, and highlight methodological characteristics of studies that will be considered in the evaluation and synthesis of the critical scientific evidence. This evidence is presented in evidence tables and exposure-response arrays. Additionally, anticipated key scientific issues for the chemical have been included as appropriate.

In 2014, IRIS released preliminary packages for several chemicals, including: ethyl tert-butyl ether (ETBE); tert-butyl alcohol (tert-butanol); hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX); hexabromocyclododecane (HBCD); diethylphthalate (DEP); hexavalent chromium; and inorganic arsenic. For each chemical, this information was released to the public, comments were received, and a public meeting was held to discuss science issues identified by EPA and the public. IRIS anticipates releasing at least 3 additional preliminary packages on selected phthalates prior to the end of FY 2014.

Improved Public Comment and Peer Review – Implemented

During the review stages of the IRIS process, EPA now releases the draft assessment and draft peer review charge for public comment and convenes a public meeting to discuss the draft documents and comments. This public meeting replaces the previous IRIS listening session and emphasizes dialogue with stakeholders. The IRIS Program considers the public comments and, in some cases, will revise the draft assessment and peer review charge to respond to the scientific issues raised in the public comments. Additionally, IRIS will summarize the public comments and provide responses to include in the draft assessment. During peer review, EPA will ask the peer review panel to review and comment on whether the IRIS Program adequately addressed the public comments.

This has been done most recently for TMBs and ammonia.

Improved Stakeholder Engagement in the IRIS Process and Assessment Development – Implemented

The IRIS Program is committed to proactively engaging with stakeholders and has recently initiated ways to improve stakeholder engagement to help ensure transparency and the use of the best available science in IRIS assessments. Engaging with stakeholders can help facilitate the development of assessments and promote public discussion of key scientific issues. Therefore,

scientific engagement with stakeholders and the public is an important part of supporting the best decisions possible.

The 2013 enhanced IRIS assessment development process includes the following additional opportunities for engagement:

- Before beginning to develop a draft assessment, the IRIS Program will conduct an internal planning and scoping meeting to identify EPA needs for the assessment. The IRIS Program will then release planning and scoping information and convene a public meeting focused on scientific issues and studies that may inform EPA's plan for developing the assessment (i.e., problem formulation).
- In the early stages of prior to assessment development, EPA will release preliminary materials and receive public comments. The IRIS Program will hold a public meeting to present these materials and discuss science issues.
- During the review stages of the IRIS process, EPA will release the draft assessment and draft peer review charge for public comment and receive comments. The IRIS Program will hold a public meeting to present the draft assessment and discuss science issues prior to external peer review.

Since the enhancements were announced, the IRIS Program has introduced a series of bimonthly public meetings to allow the public the opportunity to provide input and participate in discussions about preliminary materials and draft IRIS assessments for specific chemicals (as noted in the latter two bullets above). The first meeting, held December 12-13, 2013, provided stakeholders with the opportunity to give input and participate in an open discussion regarding preliminary materials that were prepared for IRIS chemicals prior to the development of the draft assessment. The discussion at this meeting centered on the following chemicals: ethyl tert-butyl ether (ETBE); tert-butyl alcohol (tert-butanol); and hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX). This meeting was also an opportunity for the public to provide input and discussion on draft assessments and draft charges to the peer review panel prior to external peer review for the following chemicals: ethylene oxide (EtO) and benzo[a]pyrene (BaP).

The December 2013 bimonthly public meeting was the first opportunity for stakeholders to comment on preliminary materials and draft assessments following the introduction of the enhancements in July 2013. These meetings allow stakeholders and IRIS scientists to engage in robust and productive scientific discussion and exchange information and perspectives on science issues associated with the chemicals undergoing assessment. The objective of this discussion is to ensure that the subsequent development of the draft IRIS assessments will reflect the most critical scientific issues and various perspectives on those issues.

The February 2014 bimonthly public meeting was cancelled in order to revise the format based on feedback obtained from the December meeting, and the next one was held April 23, 2014. The April meeting employed a new format intended to promote public discussion. This new format was designed to explore varying scientific perspectives from a diverse set of stakeholders on key science issues for the two assessments in question. Stakeholders were given an opportunity to suggest additional key science issues to discuss at the meeting. The discussion at the April meeting focused on hexabromocyclododecane (HBCD) and diethylphthalate (DEP).

The next IRIS bimonthly public meeting is scheduled for June 25-27, 2014 and will cover hexavalent chromium and inorganic arsenic.

Public Peer Consultation Science Workshops – Implemented

The IRIS Program has begun to hold public peer consultation science workshops to further organize and enhance input from the scientific community as assessments are designed. The overarching goal of these workshops is to better interpret and evaluate the latest scientific evidence. Information regarding specific peer consultation workshops is announced to the public in advance of the meetings. The goal of each workshop varies. For example, the workshops may focus on the state-of-the-science for a particular chemical or provide a forum for discussion with experts about certain cross-cutting scientific issues that may impact the development of a scientifically complex assessment.

In the past year, the IRIS Program held peer consultation workshops focusing on:

- State-of-the-Science Workshop to Discuss Issues Relevant for Assessing the Health Hazards of Formaldehyde Inhalation (April 30 - May 1, 2014)
- State-of-the-Science Workshop on Chemically-induced Mouse Lung Tumors (January 7-8, 2014)
- Scientific Workshop on Hexavalent Chromium (September 19 & 25, 2013)
- Workshop on Applying Systematic Review to Assessments of Health Effects of Chemical Exposures (August 26, 2013)

The IRIS Program anticipates convening an additional workshop, to be held later in 2014, to discuss general issues related to conducting health assessments of chemicals that are present endogenously (produced by the body during normal biological processes).

The IRIS Program has also just announced a public workshop to discuss some of the specific recommendations from the National Academies' National Research Council's May 2014 report on IRIS. The workshop will take place October 15-16, 2014, in the Washington, DC area, and it will be available by webinar. Specific details, including the location, agenda, and how to register, will be available at a later date.

Needs Assessment – In Progress

To increase productivity and transparency as well as respond to a recommendation from the Government Accountability Office (GAO), EPA is conducting a needs assessment to identify and evaluate the demand for IRIS assessments and the resources required to meet users' needs. Information regarding the needs assessment will be posted on the IRIS website as it becomes available.

IRIS Five-year Workplan – In Progress

The IRIS Program is developing a chemical workplan that will help schedule IRIS assessments for specific chemicals over the next five years. This five-year workplan will focus on Agency needs for IRIS assessments during this timeframe.

On June 2, 2014, a memo was sent (on behalf of IRIS) from the ORD AA to the Program Office DAAs and Deputy Regional Administrators that provided the information we have for all chemicals on the 2012 IRIS Agenda and solicited additional information from EPA Program Offices and Regions. This information will allow us to revise, revitalize and re-prioritize the IRIS Agenda. We intend to finalize an IRIS workplan to cover the next 5 years by August 1, 2014, so that we may achieve a consistent and sustainable workflow that produces high-quality, mission-oriented chemical assessments.